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CAPITAL SPENDING

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1989



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■ U.S. and Soviet science academies to launch cooperative study of global ecology. **Page 5**

■ FDA approves five-minute AIDS test developed by Massachusetts biotechnology firm Cambridge BioScience. **Page 5**

■ New study of U.S. science education describes and analyzes the educational environment as a whole. **Page 5**

■ ACS Board, meeting in Washington, D.C., re-elected Ernest L. Eisel as chairman, took action on a number of other matters. **Page 6**

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Business

Worldwide capital spending by U.S. chemical companies will rise moderately next year, spurred by continuing strong exports and demand, C&EN survey of major producers shows. **Page 9**

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LETTERS

Benzene carcinogenicity

SIR: A. C. Nixon's letter concerning benzene regulations (C&EN, Nov. 21, page 2) appears to imply that chronic exposure to benzene is not particularly hazardous. I hope that the bulk of chemists out there know better than that, but I feel compelled to respond for the sake of those who don't.

Aside from its acute narcotic effects, benzene is toxic to the blood-forming tissues. Blood disease due to chronic benzene poisoning has been recognized since the turn of the century. Epidemiologic studies indicate a significantly increased rate of leukemia in industrial workers chronically exposed to benzene. For more details, I refer interested readers to a review by Peter F. Infante and Mary C. White in *Environmental Health Perspectives* (52, 75).

Interestingly, the article that provoked Nixon's letter (C&EN, Aug. 22, page 22) was concerned not with the question of whether benzene is a carcinogen, nor with the scientific controversy over assessing cancer risk at low exposure levels, but rather with the political issue of what level of risk—for example, what number of excess cancer deaths in the population—is acceptable to our society. It appears that Nixon is attempting to duck the political question by obfuscating the underlying fact of benzene carcinogenicity.

Margaret Levin Phillips
Baltimore, Md.

Extradition clarification

SIR: I would like to point out an inaccuracy that appears in the article, "Bhopal Litigation Reaches India Supreme Court" (C&EN, Nov. 28, page 7) with respect to the extradition of Warren Anderson to India.

You have attributed to me the belief that "serious attempts to extradite Anderson could be made by India through the Uniform Enforcement of Foreign Judgments Act." Although I believe that the government of India is serious about extraditing Anderson, such extradition procedures could not be made pursuant to the Uniform Enforcement of Foreign Judgments Act. That act is applicable to enforcement of civil money judgments rendered by the Indian courts, but it has no application whatsoever to a foreign criminal charge or indictment.

My law firm has not been retained by the Indian government with respect to the criminal charges arising out of the Bhopal disaster, and, consequently, we have had no involvement in the efforts

to extradite Anderson. Instead, our involvement has been only with respect to the civil case against Union Carbide Corp.

Bruce A. Finzen

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Attorneys at Law
Minneapolis, Minn.

General chemistry courses

SIR: The recent discussion, "Refocusing of the General Chemistry Curriculum" (C&EN, Oct. 17, page 25), left me with a feeling of déjà vu and disappointment.

If we wish to present a relevant introduction to chemistry that will

(1) inform students of general chemistry—including those who, a priori, are not interested in a professional future in our field—about the crucial contributions of chemical science and technology to the well being of the nation; and

(2) reinforce the motivation and, at the same time, broaden the vision of those students who, for whatever personal reasons, are already attracted to careers in chemistry, chemical engineering, and allied specializations such as material science, biological chemistry, and so on, then educators must search for a common denominator that affects the thinking of the predominant majority of all citizens, and show how our profession responds in countless ways to this ever-present concern.

In the era of consumerism in which we live, this common denominator is the economy as witnessed by daily reports of such economic indicators as the rate of unemployment, housing starts, consumer confidence, changes in the gross national product, investment confidence as reflected by changes on the stock market, and so on. These economic reports influence the behavior of most of the citizenry not only in the marketplace but also in career choices and political decisions.

The general public, and its young who reach us in general chemistry, must acquire a clear understanding that chemistry, directly or indirectly, is deeply involved in the production of improved and convenient food products and shelters, modern communication devices, modern means of transportation, structural materials for all purposes, modern tools to fight health problems—to mention just a few categories of products that improve the quality of life generally taken for granted. The general public must be made to understand that the transformation of materials to higher-value-added products generates true wealth and provides sound

Chemical Capital Spending To Continue Increasing

Strong exports and domestic sales are still squeezing capacity use, spurring major U.S. chemical firms to boost plant and equipment spending

Marc S. Reisch,
C&EN Northeast News Bureau

Worldwide capital spending by U.S. chemical companies will increase moderately in 1989, according to preliminary forecasts by leading chemical producers. Only nine of the 12 major chemical producers that C&EN surveys every year at this time were able to forecast their 1989 expenditures. For those nine companies, 1989 capital spending will rise 14% from 1988 to a combined \$4.95 billion. That forecast follows a monumental 31% increase in 1988 capital spending from the previous year.

A stronger than expected economy in 1988 apparently has caught at least two chemical companies off guard, and so this year they do not feel confident in making their usual early capital spending forecasts. Hercules and Monsanto, who together spent \$820 million in 1988 on capital projects, have not provided a 1989 forecast. Nor has Du Pont, but its board of directors frequently meets so late in the month that its forecast cannot be included in C&EN's December survey.

So the 1989 forecast is based on Air Products & Chemicals, American Cyanamid, Dow Chemical, Ethyl Corp., W. R. Grace & Co., Olin, PPG Industries, Rohm & Haas, and Union Carbide. Like previous years' surveys, this year's sampling of 1989 spending forecasts indicates a trend for the entire chemical industry's

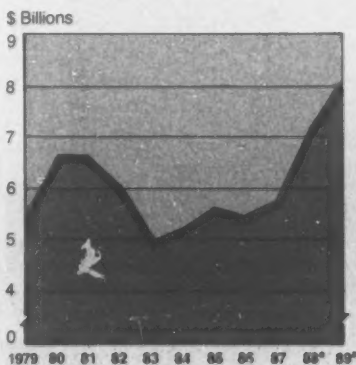
capital spending next year. Although the survey provides nine distinct decisions on the direction that management feels capital expenditures will take in 1989, it lacks Du Pont's numbers, which made up almost a third of 1987 capital expenditures for the group of 12, and also Hercules' and Monsanto's numbers, which represented 12% of the group's spending in 1987.

Of course conditions change during the year and company spending can greatly exceed the amount management originally planned. Air Products, for instance, originally planned to spend \$400 million in 1988, but instead reports it spent closer to \$542 million this year—36% higher. In six cases, actual 1988 expenditures exceeded capital expenditures planned for 1988. The same group of companies surveyed last year on planned 1988 capital expenditures, excluding Du Pont, collectively forecast expenditures 20% ahead of 1987, but actually report they spent 31% above their 1987 spending levels.

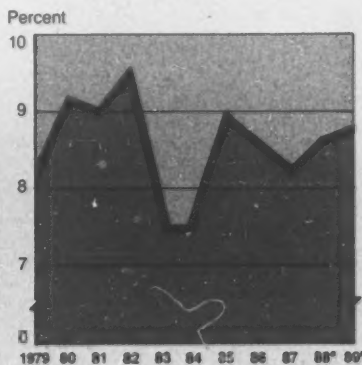
Last year at this time, 1988 was not expected to be so strong a year as it was. Chemical industry economists were predicting strong sales to overseas customers because of the decline of the dollar relative to most other world currencies. But housing and automobile markets were expected to remain soft, and agriculture only had slightly better prospects coming out of a period of steep decline.

This year has proved to be a strong year for exports. It has proved to be a very strong year for domestic sales in all categories as well. With demand so high for most products, supplies are tight and therefore capacity use has been high as well. The shortness in supplies of some chemical products such as ethylene has allowed for price increases that in some cases are very high. As a result, C&EN has adjusted its 1988 estimate of industry capital spending as a percentage of sales: Last year industry capital spending as a percentage of sales for 1988 was projected at 9.3% (C&EN, Dec. 21, 1987,

Chemical capital spending will rise moderately...



...and also will increase as a percentage of sales



Note: Combined data from 12 major chemical producers listed on page 10. a C&EN estimates.

Capital spending of surveyed companies will increase 14% next year

\$ Million	1989		1988		Worldwide					Change from previous year	
	Total	U.S.	Total	U.S.	1988 planned ^a	1987	1986	1985	1984	1988	1987
Air Products ^b	\$ 550	na	\$ 542	na	\$ 400	\$ 323	\$ 367	\$ 392	\$ 263	1.5%	67.8%
American Cyanamid	350	\$ 280	350	\$ 280	350	268	263	203	200	0	30.6
Dow Chemical	1650	950	1250	750	1200	995	890	806	761	32.0	25.6
Du Pont ^c	na	na	na	na	na	1824	1587	1515	1319	na	na
Ethyl	150	135	125	115	150	139	134	90	103	20.0	-10.1
W. R. Grace	475	210	430	270	400	243	199	348	380	10.5	77.0
Hercules	na	na	250	195	250	205	257	234	218	na	22.0
Monsanto	na	na	570	390	513	505	520	645	614	na	12.9
Olin	130	na	150	na	158	115	128	154	165	-13.3	30.4
PPG Industries	500	375	425	300	450	426	356	452	315	17.6	-0.2
Rohm & Haas	350	235	330	210	300	222	179	159	124	6.1	48.6
Union Carbide	800	550	740	518	580	502	524	649	670	8.1	47.4
TOTAL	\$4955	\$2745	\$5182	\$3028	\$4751	\$5787	\$5404	\$5647	\$5152		
ANNUAL CHANGE^d	14%	12%	31%	16%		7%	-4%	10%	5%		

a Earliest estimate. b Fiscal year ends Sept. 30. c Excludes Conoco. d Cumulative change for companies reporting. na = not available.

page 9), but more recent calculations put that figure close to 8.7%.

During the first nine months of 1988, sales for the 15 largest chemical companies rose about 20% from a year earlier (C&EN, Nov. 14, page 24). Because of that stellar performance and the increases in 1988 capital expenditures companies reported for this survey, C&EN has revised upward its capital spending estimate for the group of 12 to \$7.26 billion from the \$6.84 billion forecast in last year's survey.

For next year, high demand and high operating plant rates for base petrochemicals and polymers are expected, according to William C. Kuhlke, vice president of DeWitt & Co., Houston consultants. He adds

that "1989 will see a more balanced supply/demand market characterized by continuing high prices, good profitability, and the possibility of spot shortages."

With demand remaining strong, and with relatively stable price conditions for petrochemical feedstocks, chemical companies have an incentive to expand petrochemical output. In fact, many companies have announced expansions in basic petrochemicals, a scenario no one could have expected following the rash of shutdowns and capacity rationalizations after the recession of 1982. The Houston Gulf Coast area seems to be benefiting from the high demand in petrochemicals. At a recent press conference in New York

City sponsored by the Houston Economic Development Council, Ray Porter, manager of industrial development at Houston Lighting & Power Co., said that \$3.1 billion in capital projects have been announced in the Houston area during the year ended in November—twice the value of projects announced in the same survey in 1987.

As an additional incentive to build domestic capacity, Richard A. Stuckey, Du Pont's chief economist, points out that chemical imports rose 8% last year and he estimates the rise this year has been about 22%. The resurgence of imports comes on a relatively low base and has served to keep user plants operating. But he finds the increase disturbing nevertheless. He predicts, though, that the U.S. chemical trade surplus will be at or near the all-time record of \$12.1 billion in 1988, up from \$10 billion last year.

The 14% increase in capital spending forecast for next year pales by comparison with 1988's 31% increase. However, 1988 seems to have been a watershed year when chemical companies realized they could not just make do with debottlenecking projects and small expansions, but they would have to commit to significant capacity expansions to satisfy the demand for products.

Even with the 31% boost in capital spending reported for the group of surveyed companies, a number of companies individually boosted their spending for the year at a



Chemical plant construction was up markedly this year

much higher rate. Grace, for instance, increased its 1988 capital spending 77% to \$430 million. That hike continues to reflect the increased emphasis Grace has placed on the specialty chemical business since it spun off its retailing and restaurant operations.

Also up significantly was Air Products' spending, rising 68% to \$542 million. The figure includes the acquisition of capital assets when Air Products acquired Anchor Chemical in December 1987 (Air Products reports its results on a fiscal year basis and purchases made in the last quarter of 1987 are included in fiscal 1988 results). A company spokesman points out that its capital expenses figure includes significant spending to upgrade existing units and the addition of efficient capacity.

Other chemical producers reporting higher increases in capital spending than the group average are Rohm & Haas, with a 49% increase to \$330 million, and Union Carbide, with a spending boost of 47% to \$740 million.

Five chemical producers reported capital expenditures under the 1988 average for the group but still well ahead of inflation. American Cyanamid increased its expenditures at a pace close to that for the group at almost 31% to \$350 million. Olin also was close, with a 30% increase to \$150 million. Dow Chemical increased its 1988 spending 26% on an already substantial base to \$1.25 billion. Hercules also increased its spending well ahead of inflation, up 22% to \$250 million; and Monsanto increased its capital spending 13% to \$570 million.

Only two chemical companies did not invest at a double-digit rate of increase in 1988. PPG Industries investments in capital equipment actually declined 0.2% and Ethyl had an even greater drop of 10% to \$125 million.

Seven of the nine chemical companies who could forecast their 1989 capital expenditures plan increased spending. Following strong sales and earnings in 1988, Dow Chemical leads the pack with an increase in its spending forecast at 32% above 1988 expenditures, more than double the average 14% boost planned

West German chemical giants plan modest spending hikes

West Germany's three largest chemical companies—BASF, Bayer, and Hoechst—plan modest increases in their capital expenditure programs for 1989 to \$5.66 billion worldwide and \$1.08 billion for their U.S.-based operations. As a group, they plan to spend 6% more than their estimated 1988 expenditures worldwide, and 5% more than their U.S. expenditures this year (figures are based on a conversion rate of \$1.00 = 1.7 deutsche marks for both 1988 and 1989).

Like their U.S. counterparts, the three companies spent considerably more in 1988 than they originally planned in last year's survey. Worldwide expenditures of the three were up 25% to \$5.36 billion in 1988 compared with 1987. U.S. spending was up even more dramatically, 37% in 1988 to \$1.03 billion.

Thus, for 1988 the West German chemical companies' spending patterns were exactly opposite that of their U.S. competitors. While U.S. chemical producers increased their spending worldwide at a faster pace than they did in the U.S., BASF, Bayer, and Hoechst boosted their spending in the

U.S. at a much faster pace than they did worldwide. For 1989, the three companies, like their U.S. counterparts, predict they will allow their U.S. investments to lag their worldwide expenditures.

Like their U.S. counterparts, the West German chemical companies increased their 1988 chemical spending beyond their original plans. In last year's survey (C&EN, Dec. 21, 1987, page 11), they planned to increase 1988 worldwide spending only 7% and U.S. spending 23%.

In this year's survey, Bayer is the only company planning a double-digit capital spending boost, 10% in 1989 to \$1.89 billion. Hoechst and BASF lag much further behind. Hoechst plans a 3.6% boost in 1989 to \$1.71 billion and BASF a 3.3% hike to \$2.07 billion.

As for U.S. capital spending next year, Hoechst plans to keep expenditures for its U.S. operating unit, Hoechst Celanese, at the \$350 million level it reports for 1988. BASF plans to raise U.S. capital investment nearly 6% in 1989 to \$450 million. Bayer forecasts the largest increase, 12% to \$280 million.

\$ Millions*	1988		1989		Change from previous year	
	Total	U.S.	Total	U.S.	1988	1989
BASF	\$2065	\$ 450	\$2000	\$ 425	3.3%	30.5%
Bayer	1888	280	1711	250	10.3	20.1
Hoechst	1711	350	1652	350	3.6	24.2
TOTAL	\$5664	\$1080	\$5363	\$1025		
ANNUAL CHANGE	6%	5%	25%	37%		

* \$1.00 = 1.7 deutsche marks.

for the nine companies, to \$1.65 billion.

Others planning sizable spending increases in 1989 include PPG Industries, which forecasts an 18% increase from 1988 to \$500 million, and Ethyl, which plans a 20% increase to \$150 million.

Smaller increases in capital spending are planned by Union Carbide, up 8.1% to \$800 million; Rohm & Haas, up 6.1% to \$350 million; and Air Products, up a modest 1.5% to \$550 million. American Cyanamid says at this time that it plans no increase in its 1989 capital expenditures and will spend \$350 million, the same amount it estimates for

1988. Olin expects the only actual drop in 1989 capital spending—down 13% to \$130 million.

As in last year's survey, companies responding to C&EN's inquiries increased capital expenditures in the U.S. at a slower pace than worldwide. Of the nine companies providing data, 1988 capital expenditures in the U.S. rose 16% from 1987 spending, about half the rate of worldwide spending increases reported by 11 of the 12 companies in the survey. The forecast for 1989 shows that the level of U.S. spending increases remains below the 14% predicted for worldwide capital expenditures. □

Mass Terminations of Chemists Finally May Be on the Decline

In one way the latest report by ACS's Committee on Professional Relations (CPR) on multiple terminations of chemical professionals represents good news. It is the smallest such report since 1981. It covers just five such mass firings and involves a total of only 42 chemists and chemical engineers. The previous report covered eight terminations involving more than 200 chemical professionals (C&EN, Aug. 15, page 31).

Only time will tell if the new report reflects an end to the major chemical industry restructurings of

recent years. Such reorganizations in many cases have been necessary to keep operations competitive and viable. But they have cost many chemists, especially older ones, their jobs.

There are at least two other positive aspects to the latest report. In three of the four terminations for which there are sufficient data to make a judgment, terminees were apparently treated relatively well. Also none of the firings involved the restrictive termination agreements of the type that has been of concern to CPR lately.

The latest report is the 28th in a series produced by CPR since 1974. They all compare the performance of employers having terminations with standards spelled out in ACS's Professional Employment Guidelines (PEG). These standards are concerned with advance notice, severance pay, assistance in finding new employment, pension vesting, length of terminnee's service, and extension of protection plans.

Compliance with these standards is at 58% in the latest report. This is substantially higher than the 48% long-term average for the previous 27 reports.

The largest termination covered in the new report was at Bayer USA's Miles subsidiary. Resulting from what the company describes as a "redirection of priorities," it involved the involuntary separation of 15 chemists and chemical engineers. The other terminations involved nine chemical professionals at PPG Industries, eight at SeaPharm, seven at Westinghouse Hanford, and three at Battelle Memorial Institute. According to CPR, the cutbacks at both Westinghouse and Battelle resulted from termination of some nuclear waste studies, and the firings at SeaPharm may have been related to the filing of a petition for bankruptcy by the company.

CPR has no other verified mass terminations under investigation, although some unverified reports of such firings are being examined. A mass termination is defined by CPR as a situation in which the employment of three or more chemical professionals is terminated within a six-month period for reasons other than continuation of previously documented inadequate performance, completion of a contract, or cause. All terminations need not have worked at the same location.

Employer compliance with ACS employment guidelines

These employers provided information

	Approximate number of employees separated	Advance notice	Severance pay	Assistance	Pension vesting	Employee service	Protection plans
Miles, subsidiary of Bayer USA (Elkhart, Ind.)	15						
PPG Industries, Chemical Division (Barberton, Ohio)	9						
Westinghouse Hanford (Richland, Wash.)	7						

These employers provided no information; hence, all ratings based on terminnee responses

Battelle Memorial Institute (Richland, Wash.)	3	.	.	.	.	.	.
SeaPharm (Fort Pierce, Fla.)	8						

*No information from any source.

☐ Employer met or exceeded guideline standard.

☒ Two or more individuals below guideline standard, but average experience better than "substantially below" criterion.

☒ Employer was substantially below guideline standard, which is defined as follows:

- Advance notice—less than two weeks.
- Employee service—more than 40% of terminnees had 10 or more years of service.
- Assistance—no assistance rendered.
- Protection plans—no continuation of protection plans.
- Severance pay—less than one week per year of service.

ACS guidelines

Advance notice. Four-week minimum.

Severance pay. Minimum is two weeks per year of service. Additional notice may be given, by mutual agreement, in lieu of severance pay.

Assistance. Efforts should be made to place terminée in another position within the organization, or terminée should be given assistance to find employment elsewhere.

Pension plan vesting. Full vesting after 10 years' service.

Employee service. Those with minimum of 10 years' service should not be terminated except for continued evidence of previously documented inadequate performance or cause.

Employee protection plans. Should be extended for a minimum of one month, plus two weeks for each year of employee service, following termination, at same rate of contribution as before. Employee would have additional 31-day grace period.

CPR seeks information on terminations from employers, ACS local sections, terminées, and other individuals. In the latest report three of the five employers provided at least some data, as did the Akron and Richland local sections. The committee will provide copies of termination reports as well as a summary list of all terminations on request to American Chemical Society, Office of Professional Relations, 1155—16th St., N.W., Washington, D.C. 20036.

The PEG standard on employee service states that those with a minimum of 10 years of service should not be terminated, except for continued inadequate performance or cause. However, 77% of all terminations investigated by CPR to date have involved such experienced chemical professionals. And older chemists continue to be particularly vulnerable in termination situations, an issue of continuing concern to CPR. In the latest report only the terminations at SeaPharm did not involve experienced chemists.

Michael Heylin

Call for nominations for polymer award

The ACS Division of Polymer Chemistry is inviting nominations for the 5th Creative Polymer Chemistry Award. The award will be presented at the division's fall 1989 meeting, and is given to recognize and encourage accomplishment and/or innovation of unusual merit in the field of basic or applied polymer chemistry by younger scientists. It consists of a plaque and \$2000 and is presented biennially in odd-numbered years, provided a qualified person is available. Travel expenses to the division's fall meeting will be paid. The recipient is expected to present a lecture at the meeting.

The award, sponsored by Dow Chemical Co., was established in 1980, and is administered by the division. A nominee must be a member or affiliate of the division, must

have accomplished outstanding work in basic or applied polymer chemistry, and shall not have reached the 45th birthday on Jan. 1 of the year of the award.

Eight copies of the complete nominating document (including date of birth, membership status, a synopsis of the accomplishments of the nominee, and a maximum of five reprints or other supplementary material for each copy), letter-size and unbound, must be furnished for distribution to the members of the awards committee. A maximum of three supporting letters (eight copies each) that contain factual information about the candidate not provided in the nominating document may be included as part of the nomination. The nomination and its accompanying material must be postmarked no later than midnight, Jan. 31, and sent to H. James Harwood, Department of Polymer Science, University of Akron, Akron, Ohio 44325. □



Bust of Carl Marvel dedicated at ACS headquarters

A life-size bronze bust of the late polymer chemist Carl Shipp Marvel was dedicated recently at ACS headquarters by Du Pont chairman and chief executive officer Richard E. Heckert. Du Pont commissioned sculptor Charles C. Parks to make the bust after Marvel's death earlier this year. The bust, which was unveiled at the 3rd Chemical Congress of North America in Toronto in June, commemorates Marvel's long association with ACS and will be placed near the entrance to Marvel Hall at ACS headquarters. The hall was named at the request of a number of Marvel's students who contributed generously to the building fund for the ACS headquarters building opened in 1960. Marvel, known to his students and associates at the University of Illinois as "Speed," directed research on synthetic rubber and is known as the father of high-temperature polymers. He worked as a consultant for Du Pont for nearly 60 years.